



IB MYP YEAR 5
ASSESSMENT TASK
A Broad-based Test

Subject:	Y9 <i>Standard</i> Mathematics	Name : <i>Josephine</i> (Class) <i>Y9 Hope</i>	Miss. <i>LoK</i> ()
Assessment:	Broad-based Test		
Date of assessment:	8 th June, 2012		

- This task assesses Criteria A and C;
- Time allowed – *1 hour and 30 mins*;
- You must answer all the questions;
- Write your answers in the spaces provided;
- Show all of your working – not just the answer
- Scientific Calculator is allowed.

Criterion A		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Students are reasonably successful with the Part A questions only. Any errors here are relatively minor.	The student generally makes appropriate deductions when solving simple problems in familiar contexts.
3-4	Students are successful with Part A questions. The only errors in part B questions are minor.	The student generally makes appropriate deductions when solving more complex problems in familiar contexts.
5-6	Students are successful with Part A and B questions. The only errors in part C questions are minor.	The student generally makes appropriate deductions when solving challenging problems in a variety of familiar contexts.
7-8	Students are successful with Part A, B and C questions. The only errors in part D questions are minor.	The student consistently makes appropriate deductions when solving challenging problems in a variety of contexts including unfamiliar situations.

Criterion C		
Levels	Task-Specific Rubric	Official IB Descriptors
0	The student does not reach a standard described by any of the descriptors given below.	
1-2	Very little working is shown, and/or the steps shown are confusing. Only the most basic mathematical symbols are used with accuracy.	The student shows basic use of mathematical language and/or forms of mathematical representation. The lines of reasoning are difficult to follow .
3-4	The working shown is generally adequate. Only a few errors in symbols/terminology are evident. It is reasonably easy to follow a student's logic/reasoning.	The student shows sufficient use of mathematical language and forms of mathematical representation. The lines of reasoning are clear though not always logical or complete . The student moves between different forms of representation with some success .
5-6	There are very few, if any, errors in symbols/terminology. All steps in calculations are shown in their completeness. It is easy to follow all the student's logic/reasoning.	The student shows good use of mathematical language and forms of mathematical representation. The lines of reasoning are concise, logical and complete . The student moves effectively between different forms of representation.

Part A (Level 1-2 Questions)

1. Factorize the following

a. $x^2 - 16x$

$$= x(x - 16)$$

Answer (a) $x(x - 16)$

b. $x^2 - 16$

$$= (x - 4)(x + 4)$$

Answer (b) $(x - 4)(x + 4)$

c. $x^2 + 3x - 28$

Answer (c) $(x - 4)(x + 7)$

2. Consider a set of data 11cm, 15cm, 19cm, 8cm, 9cm, 12cm, 13cm, 15cm, 17cm and 12cm.

a. Find the mean of this set of data.

$$\frac{11 + 15 + 19 + 8 + 9 + 12 + 13 + 15 + 17 + 12}{10}$$

$$= \frac{131}{10} = 13.1$$

Answer (a) 13.1

b. Find the median of this set of data.

$$\frac{9 + 12}{2}$$

$$= \frac{21}{2} = 10.5$$

Answer (b) 10.5

c. Find the mode of this set of data.

Answer (c) 12, 15

Part B (Level 3-4 Questions)

3. In Ivan's family, there are 8 members, including Ivan himself, his father, mother, grandmother, 2 elder brothers, 1 elder sister and 1 younger sister. If a person is chosen at random, find the probabilities of the following events happening.

a. Ivan's elder brother is chosen.

Answer

(a)

$$\frac{1}{8}$$

b. A male is chosen.

Answer

(b)

$$\frac{1}{2}$$

4.

- a. Show that $\cos^2 x - \sin^2 x = 2\cos^2 x - 1$

$$\begin{aligned}\cos^2 x - \sin^2 x &= 2\cos^2 x - 1 \\ \cos^2 x - \sin^2 x &= 2\sin^2 x \\ \sin^2(90^\circ - \theta) - \sin^2 x &= 2\sin^2 x \\ \sin^2 x - \sin^2 x &= 2\sin^2 x \\ 2\sin^2 x &= 2\sin^2 x\end{aligned}$$

Answer

(a)

$$2\sin^2 x = 2\sin^2 x$$

- b. If $\cos \theta = \frac{1}{5}$, find the value of $\cos^2 x - \sin^2 x$

$$\begin{aligned}\cos^2 x - \sin^2 x &= \left(\frac{1}{5}\right)^2 - \sin^2 x \\ &= \frac{1}{25} - \sin^2 x\end{aligned}$$

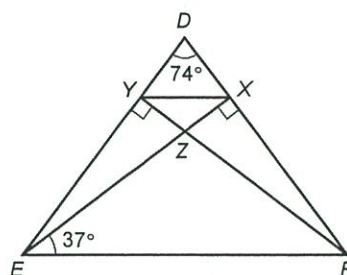
Answer

(b)

$$\frac{1}{25} - \sin^2 x$$

Part C (Level 5-6 Questions)

5. In the figure, DYE and DXF are straight lines. EX and FY are the altitudes of $\triangle DEF$ on DF and DE respectively, and they intersect at Z . $\angle EDF = 74^\circ$ and $\angle XEF = 37^\circ$.



- a. Prove that $\triangle DEF$ and $\triangle ZEF$ are isosceles triangles.

$\triangle DEF$

$$\angle DXE = \angle EXF \text{ (altitude)}$$

$$= 90^\circ$$

$$\angle FYE = \angle FYD \text{ (altitude)}$$

$$= 90^\circ$$

$$\angle DEF = \angle DFE \text{ (int. } \angle\text{s, supp.)}$$

$$74^\circ + \angle DEF + \angle DFE = 180^\circ \text{ (sum of } \triangle)$$

$\therefore \triangle DEF$ is isosceles triangles

$\triangle ZEF$

$$\angle ZEF = \angle ZFE \text{ (int. } \angle\text{s, supp.)}$$

- b. Prove that $EF \parallel YX$.

$$EF \parallel YX$$

$$\left(\frac{ZE}{ZF}\right) = \left(\frac{DE}{DF}\right) \quad \text{---} \quad ??$$

$$\therefore EF \parallel YX$$

$$\angle YZX = \angle EZF$$

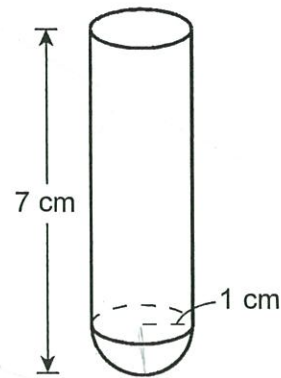
(vert. opp. \angle s)

$$\angle XZF = \angle YZE$$

(vert. opp. \angle s)

$\therefore \triangle ZEF$ is isosceles triangles.

6. The figure shows a solid composed of a right cylinder and a hemisphere. The height of the solid is 7 cm and the base radius of the cylinder is 1 cm.



- a. Find the volume of the solid.

(Express your answers in terms of π .)

Volume of the hemisphere:

$$\frac{4}{3} \times \pi \times 1^3 \div 2$$

$$= \frac{2}{3} \pi \text{ cm}^3$$

Volume of the cylinder:

$$\pi \times 1^2 \times 7$$

$$= 7\pi \text{ cm}^3 - \frac{2}{3} \pi \text{ cm}^3$$

$$= 6.33\pi \text{ cm}^3$$

Answer (a) $7.00\pi \text{ cm}^3$

Volume of the solid:

$$\frac{2}{3} + 6.33$$

$$= 7.00\pi \text{ cm}^3 \text{ (corr. to 3 sig. fig.)}$$

- b. Find the total surface area of the solid.

(Express your answers in terms of π .)

Surface area of the cylinder:

$$2 \times \pi \times 1^2 +$$

$$= 2\pi \text{ cm}^2$$

$$7 \times 2\pi$$

$$= 14\pi \text{ cm}^2 - 2\pi \text{ cm}^2$$

$$= 12\pi \text{ cm}^2$$

$$12\pi \text{ cm}^2 + 2\pi \text{ cm}^2$$

$$= 14\pi \text{ cm}^2$$

Answer (b) $16\pi \text{ cm}^2$

Surface area of the sphere:

$$4 \times \pi \times 1^2 \div 2$$

$$= 2\pi \text{ cm}^2$$

Surface area of the solid:

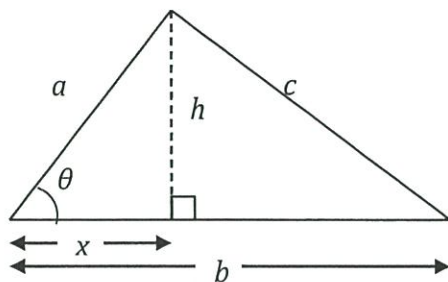
$$14 + 2$$

$$= 16\pi \text{ cm}^2$$

$$16\pi \text{ cm}^2$$

Part D (Level 7-8 Questions)

7. Given a triangle:



For questions a – d, write equations that:

a. relates: a , h , and x

$$\sin \theta = \frac{h}{a}$$

$$\cos \theta = \frac{x}{a}$$

$$\tan \theta = \frac{h}{x}$$

b. relates: x , a and θ

$$\cos \theta = \frac{x}{a}$$

Answer (a)

Answer (b)

c. expresses c^2 in terms of x , b and h

$$h^2 + (b-x)^2 = c^2$$

Answer (c)

d. Using equations above, show that $c^2 = a^2 + b^2 - 2ab \cos \theta$

$$c^2 = a^2 + b^2 - 2ab \cos \theta$$

$$c^2 = h^2 + (b-x)^2 - 2ab \cos \theta$$

$$c^2 = h^2 - 2ab \cos \theta + (b-x)^2$$

8. Given the points A(2,R), B (1,1) and C (4,3)

a. Find the distance between B and C

$$\sqrt{(1-4)^2 + (1-3)^2}$$

$$= \sqrt{9 + 4}$$

$$= \sqrt{13}$$

$$= 3.61 \text{ (corr. to 3 sig. fig.)}$$

Answer

(a)

3.61

b. Find the equation of the line passing through B and C

$$\frac{1-3}{1-4}$$

$$= \frac{-2}{-3}$$

$$= \frac{2}{3}$$

Answer

(b)

(2,3)

c. If the line AC is \perp to BC, find the value of R

Answer

(c)

d. Find the $\angle ABC$

Answer

(d)

--The End of Paper---